

***Lecanora moniliformis* sp. nov. from China**

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ABSTRACT—A new multisporied *Lecanora* species from China is proposed as *L. moniliformis*, which is similar to *L. japonica* but differs by its crenate apothecial margin and the presence of psoromic acid. A detailed taxonomic description, ecological and chemical characters, and illustrations are provided for the new taxon, and a key to the multisporied species of *Lecanora* is presented.

KEY WORDS—16-spored, taxonomy, *Lecanoraceae*, East Asia, lichenized fungi

Introduction

The *Lecanora subfusca* group, which is the core group of *Lecanora* Ach., is characterized by the presence of oxalate crystals in the amphithecium and the production of atranorin and/or usnic acid in the cortex (LaGreca & Lumbsch 2001). Eleven multisporied species belong to the *subfusca* group, and seven of them have been reported from China: *L. bruneri* Imshaug & Brodo, *L. cateilea* (Ach.) A. Massal., *L. japonica* Müll. Arg., *L. loekoesii* L. Lü & al., *L. shangrilaensis* Z.T. Zhao & L. Lü, *L. subjaponica* L. Lü & H.Y. Wang, and *L. weii* L.F. Han & S.Y. Guo (Alstrup 1993; Han & al. 2009; Lü & al. 2012; Lü & Zhao 2017; Nayaka & al. 2006; Wang & al. 2007, 2013).

During a recent study of *Lecanora* from China, we found a new species belonging to the *subfusca* group, which is described here. We also provide a key to the multisporied *Lecanora* species.

Materials & methods

The specimens collected from Anhui, Hubei, and Shaanxi are housed in the Lichen Section of the Botanical Herbarium, Shandong Normal University, Jinan, China

(SDNU). Macromorphological characters were examined under a COIC XTL 7045B2 stereomicroscope and photographed using an Olympus SZX16 dissecting microscope. Micromorphological characters, such as apothecial tissues, crystal types, asci, and ascospores, were examined by hand-cut sections under an Olympus CX41 polarizing microscope and photographed using an Olympus BX61 with DP72. Lichen substances were identified using spot tests and standardized thin layer chromatography techniques (TLC) with solvent system C (Orange & al. 2010).

Taxonomy

Lecanora moniliformis L. Lü & Z.T. Zhao, sp. nov.

FIG 1

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Differs from *Lecanora japonica* by its crenate apothecial margin and the presence of psoromic acid.

TYPE: China. Hubei, Shennongjialinqu, Wenshuilinchang, alt. 1680 m, on bark, 10 Nov. 2010, Z.T. Zhao, 20101715B (Holotype, SDNU).

ETYMOLOGY: The specific epithet refers to the morphology of the apothecial margin.

THALLUS crustose; surface dirty gray to greenish gray, continuous, rough to verruculose, esorediate; margin indistinct; prothallus not visible. APOTHECIA lecanorine, sessile to constricted at the base, 0.4–1.6 mm in diam; disc reddish brown to dark brown, epruinose, plane to convex, plicated; margin concolorous with thallus, thick, entire to flexuose, verruculose to crenate; amphithecium with small crystals insoluble in K, 50–133 µm thick; cortex indistinct, basally not thickened; parathecium hyaline; epihymenium reddish brown to orange brown, pigment insoluble in K, 7.5–12.5 µm thick; hymenium hyaline, with crystals insoluble in K, 50–80 µm thick; subhymenium hyaline, 40–115 µm thick; hypothecium indistinct; paraphyses simple, up to 2.5 µm wide; asci clavate, containing (8–)12–16 spores; ascospores hyaline, simple, ellipsoid, $4\text{--}8 \times 10\text{--}16$ µm, wall <1 µm thick. Pycnidia not observed.

CHEMISTRY: cortex K+ yellow, C–, KC–, P–; medulla K+ yellow, C–, KC–, P–; atranorin and psoromic acid present.

ECOLOGY AND DISTRIBUTION: This species was found in the mountainous regions of Anhui Province and the forest regions of Hubei and Shaanxi Provinces, central China, at elevations of 1300–1700 m on the bark of *Pinus* sp.

ADDITIONAL SPECIMENS EXAMINED: CHINA. ANHUI, Liuan city, Huoshan, Baimajian, alt. 1300 m, on bark, 8 Jun. 2011, H.Y. Wang 20113235 (SDNU); SHAANXI, Ningshan, Xilinji, alt. 1500 m, on bark, 27 Jul. 2005, W. Fu L-809C (SDNU).

DISCUSSION: This species is characterized by the crenate apothecial margin, (8–)12–16-spores per ascus and the presence of psoromic acid in addition to atranorin. Two other multisporous species, *Lecanora japonica* and *L. subjaponica*,

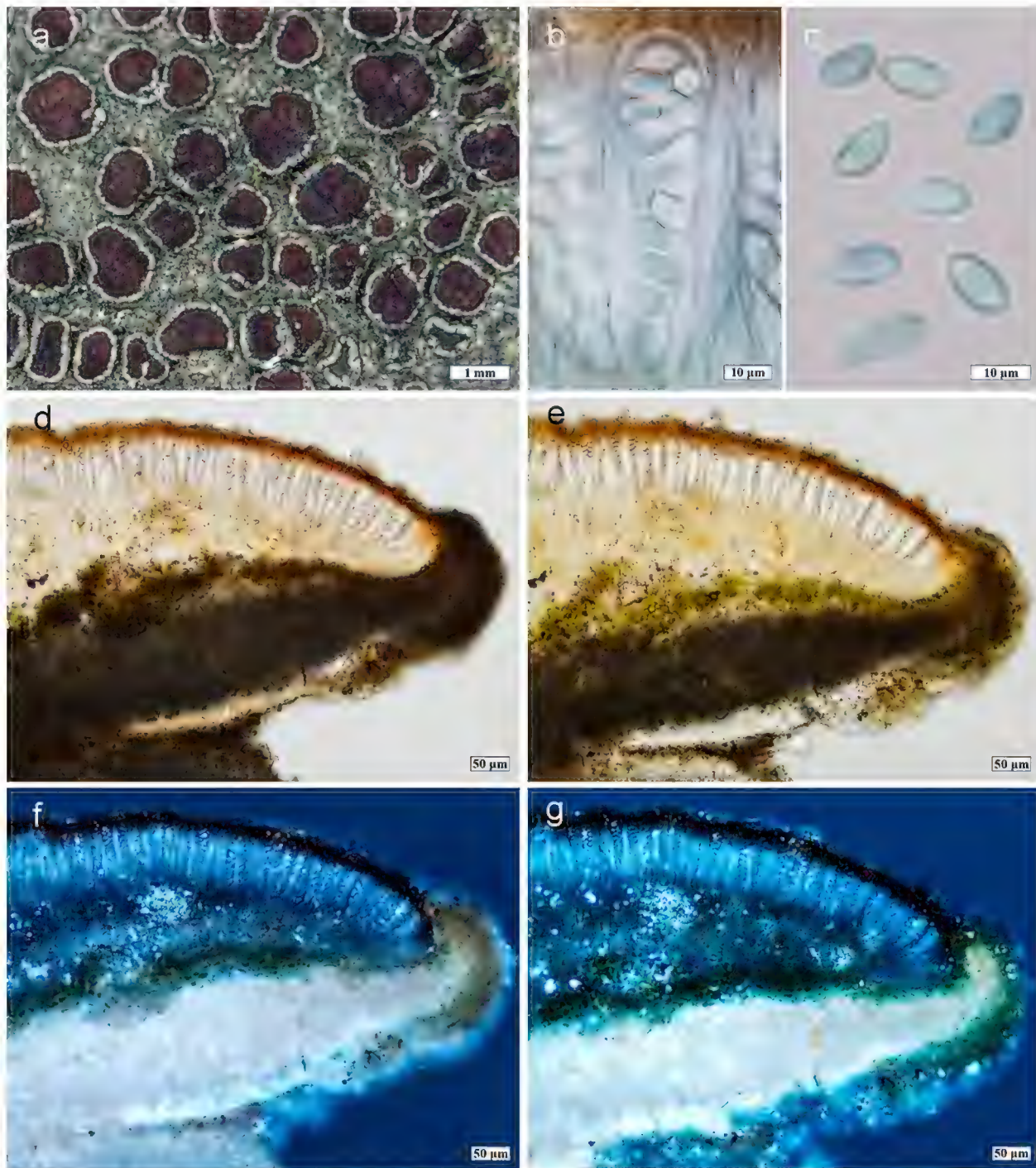


FIG. 1. *Lecanora moniliformis* (holotype, SDNU-Zhao 20101715B): a. Thallus; b. Asci; c. Ascospores; d. Apothecium section; e. Pigment of epihymenium (insoluble in K); f. Crystals of apothecium section; g. Small crystals of amphithecium (insoluble in K).

are similar to *L. moniliformis*. However, *Lecanora japonica* produces atranorin only, while *L. subjaponica* has (16–)32-spores per ascus, contains atranorin and zeorin. Furthermore, both possess an even apothecial margin. *Lecanora argentea* Oxner & A.M. Volkova also has a crenate apothecial margin, but it has 8-spores per ascus and produces gangaleoidin beside atranorin.

Key to the multisporous species of *Lecanora*

1. Epihymenium not granulose	2
1. Epihymenium granulose	5
2. Apothecial margin usually verruculose to crenate, asci (8–)12–16-spored, thallus containing atranorin and psoromic acid	<i>L. moniliformis</i>
2. Apothecial margin usually even, thallus lacking psoromic acid	3
3. Thallus containing atranorin alone; (8–)16-spored	<i>L. japonica</i>
3. Thallus containing atranorin and zeorin	4
4. Amphithecium with large crystals; 12–16-spored	<i>L. subpraesistens</i>
4. Amphithecium with small crystals; 16–32-spored	<i>L. subjaponica</i>
5. Thallus lacking atranorin	6
5. Thallus containing atranorin	7
6. Thallus containing fumarprotocetraric acids; asci 8–12-spored, ascospores simple	<i>L. shangrilaensis</i>
6. Thallus containing zeorin; asci (12–)16(–32)-spored, ascospores frequently 1-septate	<i>L. strobilinoidea</i>
7. Thallus containing usnic acid	8
7. Thallus lacking usnic acid	9
8. Apothecial disc epruinose or slightly pruinose; epihymenium with fine granules; containing atranorin, norstictic acid and zeorin, as well as usnic acid	<i>L. loekoesii</i>
8. Apothecial disc heavily pruinose; epihymenium with coarse granules; containing atranorin in addition to usnic acid	<i>L. weii</i>
9. Amphithecium with large crystals; thallus without psoromic acid	10
9. Amphithecium with small crystals; thallus with psoromic acid	11
10. Prothallus whitish grey; apothecial disc orange-brown to reddish orange; asci 8(–16)-spored	<i>L. pleospora</i>
10. Prothallus not visible; apothecial disc red-brown to blackish orange; asci (8–)12(–16)-spored	<i>L. praesistens</i>
11. Apothecia densely clustered; apothecial disc red-brown, pruinose; asci (12–)16-spored	<i>L. bruneri</i>
11. Apothecia scattered; apothecial disc yellow-brown to orange-brown, slightly pruinose; (8–)12-spored	<i>L. cateilea</i>

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Literature cited

- Alstrup V. 1993. News on lichens and lichenicolous fungi from the Nordic countries. *Graphis Scripta* 5: 96–104.
- Han LF, Zhao JC, Guo SY. 2009. *Lecanora weii*, a new multisporous species of *Lecanora* s. str. from northeastern China. *Mycotaxon* 107: 157–161. <https://doi.org/10.5248/107.157>
- LaGreca S, Lumbsch HT. 2001. Three species of *Lecanora* new to North America, with notes on other poorly known lecanoroid lichens. *Bryologist* 104: 204–211. [https://doi.org/10.1639/0007-2745\(2001\)104\[0204:TSOLNT\]2.0.CO;2](https://doi.org/10.1639/0007-2745(2001)104[0204:TSOLNT]2.0.CO;2)
- Lü L, Zhao ZT. 2017. *Lecanora shangrilaensis* sp. nov., on pinecones from China. *Mycotaxon* 132: 441–444. <https://doi.org/10.5248/132.441>
- Lü L, Zhang LL, Liu XL, Zhao ZT, Wang HY. 2012. *Lecanora subjaponica*, a new lichen from China. *Lichenologist* 44(4): 465–468. <https://doi.org/10.1017/S002428291200014X>
- Nayaka S, Upreti DK, Lumbsch HT. 2006. Two new *Lecanora* species from India. *Lichenologist* 38(5): 421–424. <https://doi.org/10.1017/S0024282906005731>
- Orange A, James PW, White FJ. 2010. Microchemical methods for the identification of lichens. 2nd edition. London: British Lichen Society.
- Wang CL, Sun LY, Ren Q, Zhao ZT. 2007. A preliminary study of multisporous *Lecanora* from Mt. Taibai. *Mycosystema* 26(1): 46–50.
- Wang HY, Ge AN, Li HM, Zhao ZT. 2013. Additional information on *Lecanora loekoesii*. *Mycotaxon* 123: 235–239. <https://doi.org/10.5248/123.235>